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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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23720	7590	10/19/2005		
WILLIAMS, MORGAN & AMERSON, P.C. 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042			EXAMINER TRINH, MICHAEL MANH	
			ART UNIT 2822	PAPER NUMBER

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/764,777	SPEYER, CHRIS	
	Examiner	Art Unit	
	Michael Trinh	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-93 is/are pending in the application.
- 4a) Of the above claim(s) 56-93 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-55 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/13/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

*** This office action is in response to Applicant's election filed on July 27, 2005. Claims 1-93 are pending, in which claims 56-93 are non-elected, without traverse as treated.

Election/Restrictions

1. Applicant's election filed July 27, 2005 of method claims 1-55 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, and because the election is implicitly "without traverse", the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Claims 56-93 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 1,2,4,6,20-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Harame et al (4,997,776).

Harame teaches a method comprising at least the steps of forming a first layer 12 of epitaxial silicon above a surface of a semiconducting substrate 10 (Figs 1,9; col 4, lines 11-32; col 7, lines 1-10); forming a second layer 16 (or 14) of epitaxial silicon above said first layer 12 of epitaxial silicon; forming a third layer 18 (or 16) of epitaxial silicon above said second layer of epitaxial silicon (col 4, lines 46-51,33-50); forming a trench isolation region (Fig 4; col 5, lines 39-65) that extends through at least said third layer of epitaxial silicon; and forming a portion of a semiconductor device above said third layer of epitaxial silicon within an area

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defined by said isolation region (Figs 5-8; col 5, line 66 through col 6). Re claim 2, wherein said semiconducting substrate 10 is doped with a dopant material of a first type and said second layer (e.g 14) and third layer (16 in Fig 3 or 58 in Fig 4) of epitaxial silicon are doped with a dopant material that is of a type opposite to that of said first type of dopant material (Figs 3,4)

Re claim 4, wherein said semiconducting substrate is doped with an N-type dopant material (col 3, lines 62-66) and said second layer 14 and third layer 16 of epitaxial silicon are doped with a P-type dopant material (Fig 3). Re claim 6, wherein said first layer 12 of epitaxial silicon is doped with an N-type dopant material (Figs 1-3). Re claim 20, wherein forming a trench isolation region comprises: performing at least one etching process to form a trench that extends through at least said third layer of epitaxial silicon; and forming at least one insulating material in said trench (Fig 4; col 5, lines 39-65). Re claim 21, wherein said semiconductor device comprises at least one of a bipolar transistor (Abstract and col 5, line 66 through col 6).

5. Claims 1,3-4,6,20-21,22-24,26,39-40 are rejected under 35 U.S.C. 102(b) as being anticipated by Zdebel (5,070,031).

Re claims 22 and 1, Zdebel '031 teaches a method comprising at least the steps of forming a first layer 14 of epitaxial silicon above a surface of a semiconducting substrate 12, said semiconducting substrate being doped with a first type of dopant material; forming a second layer 16 of epitaxial silicon above said first layer 14 of epitaxial silicon, said second layer of epitaxial silicon being doped with a dopant material that is of a type opposite to that of said first type of dopant material (Fig 1-3; col 2, lines 15-28; lines 45-66); forming a third layer 22 of epitaxial silicon above said second layer of epitaxial silicon, said third layer 22 of epitaxial silicon being doped with a dopant material that is of a type opposite to that of said first type of dopant material (col 2, line 67 through col 3), wherein said second layer 16 of epitaxial silicon has a greater concentration level of dopant material than said third layer 22 of epitaxial silicon (Figs 2-3; col 2, lines 48-55 and col 3, lines 1-6); forming a trench isolation region 30 that extends through at least said third layer of epitaxial silicon (Fig 3, col 4, lines 3-23); and forming a semiconductor device above said third layer of epitaxial silicon within an area defined by said isolation region (Fig 3; col 1, lines 12-50). Re claims 23,3, wherein said semiconducting substrate 12 is doped with a P-type dopant material and said second and third

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layers 16,22 of epitaxial silicon are doped with an N-type dopant material (Figs 2-3). Re claims 24,4, wherein said semiconducting substrate 12 is doped with an N-type dopant material and said second and third layers 16,22 of epitaxial silicon are doped with a P-type dopant material (col 3, lines 57-68). Re claim 26,6, wherein said first layer 14 of epitaxial silicon is doped with either a P-type or an N-type dopant material (col 2, lines 17-25). Re claims 39,20, wherein forming a trench isolation region comprises: performing at least one etching process to form a trench that extends through at least said third layer of epitaxial silicon; and forming at least one insulating material in said trench (Fig 3; col 4, lines 5-20 as fabricated in 07/431,420 now U.S. Patent No. 4,994,406). Re claims 40,21, wherein said semiconductor device comprises at least one of a bipolar transistor (col 1, lines 12-50).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 8,27,41,42-43,45-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zdebel (5,070,031) taken with Turner (5,177,025).

Re claims 8,27,41, Zdebel '031 teaches a method comprising at least the steps of forming a first to third layers of epitaxial silicon above a surface, as applied to claims 1,3-4,6,20-21,22-24,26,39-40 above. Re claim 42, similar discussion to claims 23 and 3. Re claim 43, similar

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discussion to claims 24 and 4. Re claim 45, similar discussion to claims 26 and 6. Re claim 46, similar discussion to claims 39 and 20. Re claim 47, similar discussion to claims 40 and 21.

Re claims 8,27,41, Zdebel '031 lacks performing an in-situ epitaxial growth process to form the layers.

However, Turner teaches (at col 3, lines 58,50-62) forming the epitaxial layers by performing an in-situ epitaxial growth process.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first to the third layers of Zdebel '031 by performing an in-situ epitaxial growth process, as taught by Turner. This is because of the desirability to form the epitaxial layers on the same substrate with a predetermined doping concentration in each of the epitaxial layers, wherein these epitaxial layers are formed by using the same deposition apparatus so as to lower production cost,

8. Claims 9-19,28-38,48-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zdebel (5,070,031), as applied to claims 1,3-4,6,20-21,22-24,26,39-40, and taken with Turner (5,177,025), as applied to claims 8,27,41,42-43,45-47 above, and further of

Zdebel '031 teaches a method as applied to claims 1,3-4,6,20-21,22-24,26,39-40, and taken with Turner (5,177,025), as applied to claims 8,27,41,42-43,45-47 above. Re claims 10,29, Zdebel also teaches forming said first layer 14 of epitaxial silicon having a dopant concentration less than approximately 1×10^{15} ions/cm³ of an N-type dopant material (Zdebel, col 2, lines 17-25). Re claims 11,30, Zdebel '031 also teaches forming said second layer 16 of epitaxial silicon having a dopant concentration greater than approximately 5×10^{17} ions/cm³ of an N-type dopant material (Zdebel col 2, lines 48-52; col 3, lines 57-68).

Re claims 9,13,28,32,48,52, Zdebel '031 teaches the substrate having a doping concentration of about 2×10^{18} atoms/cm³ while the claims 9,13,28,32,48,52 recite approximately 1×10^{17} to 5×10^{17} ions/cm³.

However, Zdebel '946 teaches (at col 2, lines 31-35) forming the substrate having a doping concentration of approximately 2×10^{16} to 2×10^{17} ions/cm³.

The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to select the portion of the prior art's doping range of

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concentration, as taught by Zdebel '946, which is within the range of applicant's claims, because it has been held to be obvious to select a value in a known range by optimization for the best results, and would be an unpatentable modification, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In Re Aller* 104 USPQ 233,255 (CCPA 1955); *In re Waite* 77 USPQ 586 (CCPA 1948); *In Re Swanson* 56 USPQ 372 (CCPA 1942); *In Re Sola* 25 USPQ 433 (CCPA 1935); and *In Re Dreyfus* 24 USPQ 52 (CCPA 1934).

9. Claims 5,25,44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zdebel (5,070,031), as applied to claims 1,3-4,6,20-21,22-24,26,39-40, and taken with Turner (5,177,025), as applied to claims 8,27,41,42-43,45-47 above, and further of

Zdebel '031 teaches a method as applied to claims 1,3-4,6,20-21,22-24,26,39-40, and taken with Turner (5,177,025), as applied to claims 8,27,41,42-43,45-47 above.

Re claims 5,25,44, Zdebel '031 already teaches first layer of epitaxial silicon having a low doping concentration (e.g. as recited in claim 10) while the claims 5,25,44 alternatively recite the first layer being an undoped layer.

However, Joyce et al teach (at col 6, lines 10-13) forming the epitaxial layer having a low concentration or as an epitaxial layer being an undoped layer.

The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first epitaxial layer of Zdebel '031 by forming the epitaxial layer having a low concentration or as an epitaxial layer being an undoped layer, as taught by Joyce et al, because these epitaxial layers of silicon of low doping concentration or undoped are alternative for substitution and used as the epitaxial layer having very low doping concentration.

10. Claims 17-19,36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zdebel (5,070,031), as applied to claims 1,3-4,6,20-21,22-24,26,39-40, and taken with Turner (5,177,025), as applied to claims 8,27,41,42-43,45-47 above, and further of Pogge (4,307,180) and Chittipeddi (5,763,314).

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Zdebel '031 teaches a method as applied to claims 1,3-4,6,20-21,22-24,26,39-40, and taken with Turner (5,177,025), as applied to claims 8,27,41,42-43,45-47 above.

Re claims 17-19,36-38, Zdebel '031 does not detail about thickness of the layers of epitaxial silicon.

However, Pogge teaches (at col 4, lines 28-31) forming the layers of epitaxial silicon having a thickness of approximately from 0.5 to 10 microns depending upon the device to be built. Chittipeddi teaches (at col 3, lines 20-30; lines 54-62) forming the layers of epitaxial silicon having a thickness of approximately from 0.5 to 50 micron.

The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to select the portion of the prior art's range of thickness, as taught by Pogge and Chittipeddi, which is within the range of applicant's claims, because it has been held to be obvious to select a value in a known range by optimization for the best results and for a device to be built, and would be an unpatentable modification, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In Re Aller* 104 USPQ 233,255 (CCPA 1955); *In re Waite* 77 USPQ 586 (CCPA 1948); *In Re Swanson* 56 USPQ 372 (CCPA 1942); *In Re Sola* 25 USPQ 433 (CCPA 1935); and *In Re Dreyfus* 24 USPQ 52 (CCPA 1934).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 8:30 Am to 5:00 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0956.

Oacs-04



Michael Trinh
Primary Examiner